Fig.1

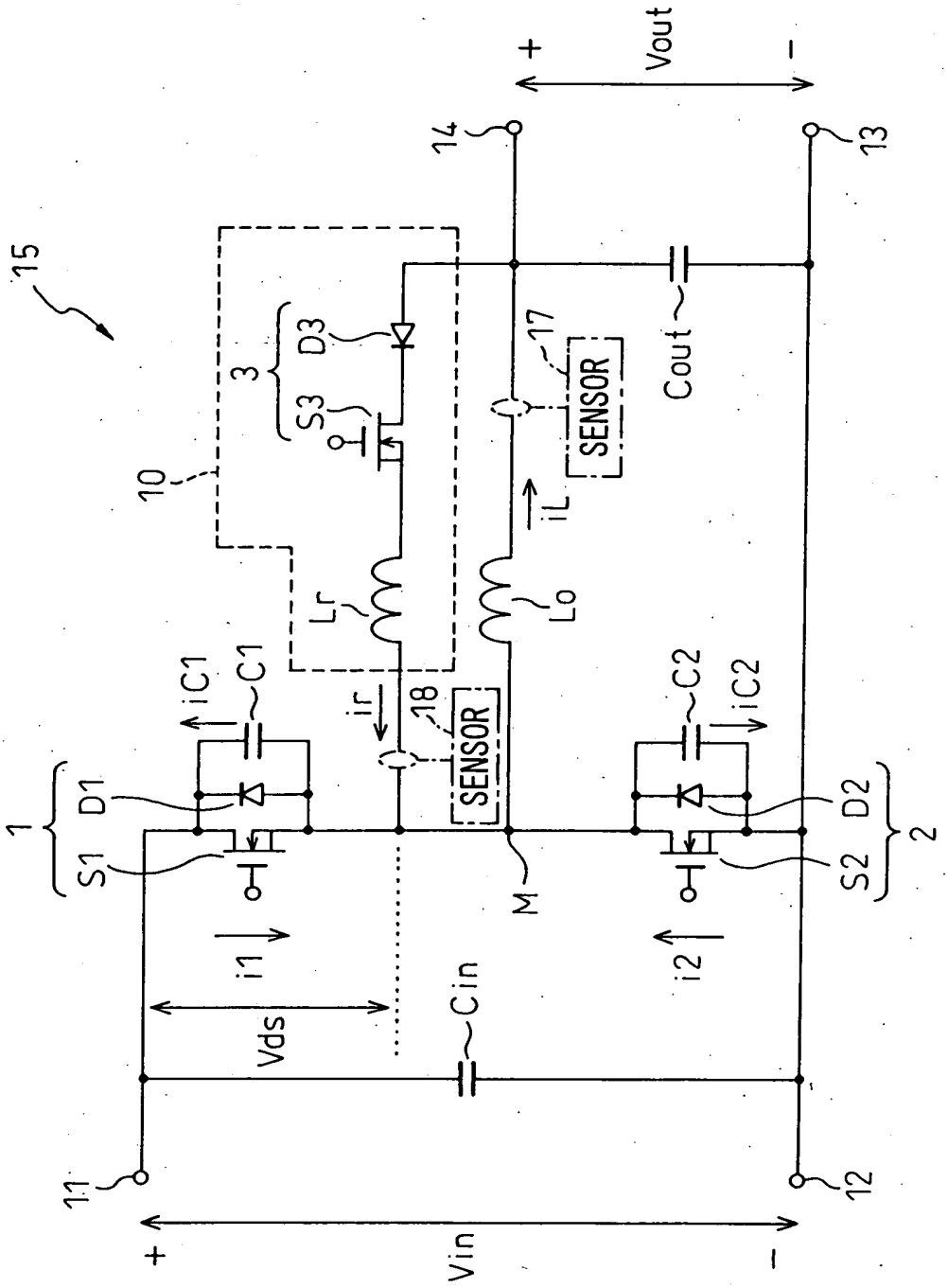

Vout
+
-
14
13
15
3
D3
S3
17
SENSOR
Cout
10
iL
Lr
Lo
iC1
C1
ir
18
SENSOR
C2
iC2
1
D1
S1
M
S2
D2
2
i1
i2
Vds
Cin
11
12
+
Vin
-

Fig. 2

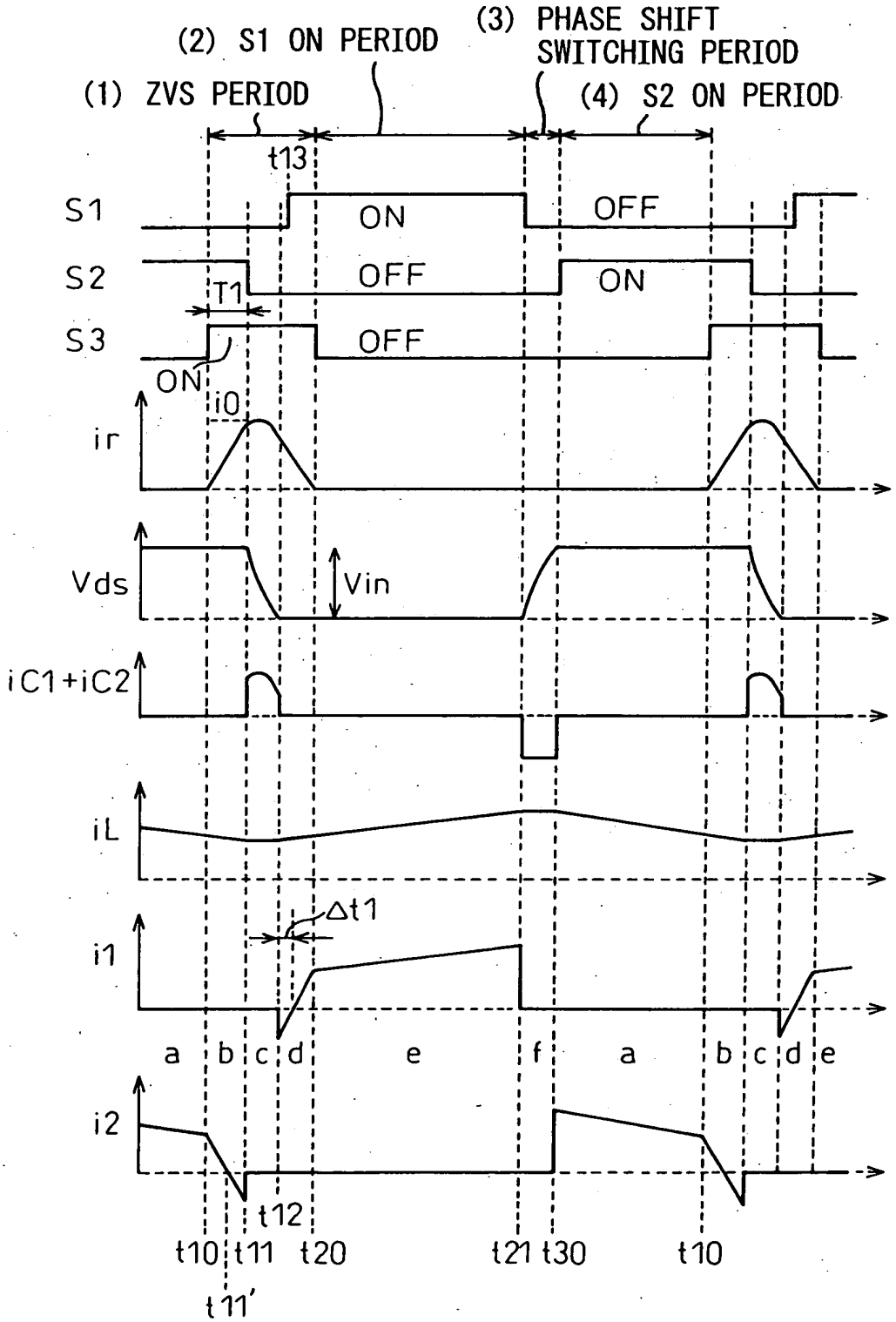

(1) ZVS PERIOD
(2) S1 ON PERIOD
(3) PHASE SHIFT SWITCHING PERIOD
(4) S2 ON PERIOD
t13
S1
ON
OFF
S2
OFF
ON
T1
S3
OFF
ON
i0
ir
Vds
Vin
iC1+iC2
iL
Δt1
i1
a b c d e f a b c d e
i2
t12
t10 t11 t20 t21 t30 t10
t11'

Fig.3(a)

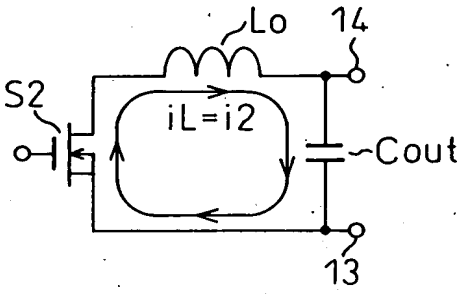


Fig.3(b)

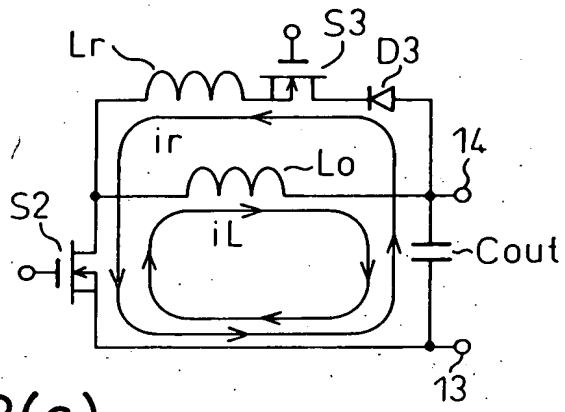


Fig.3(c)

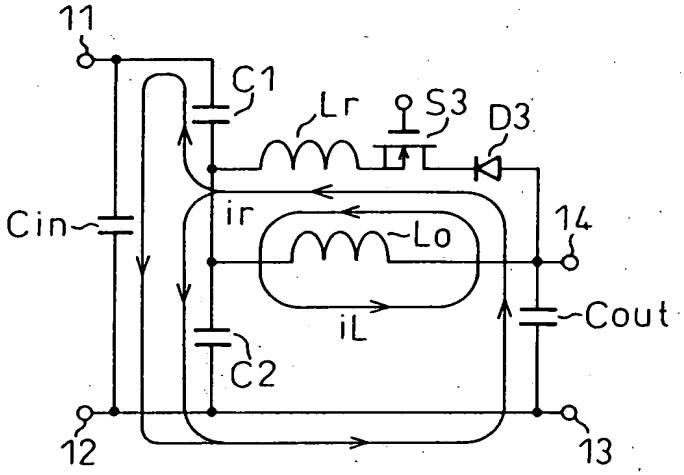


Fig.3(d)

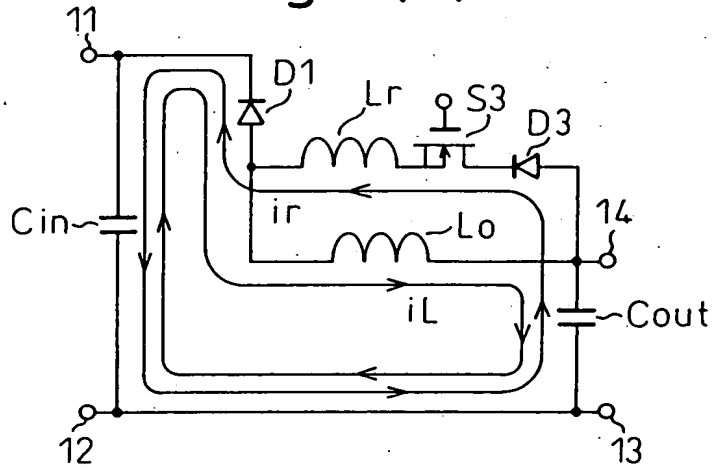


Fig. 4(d')

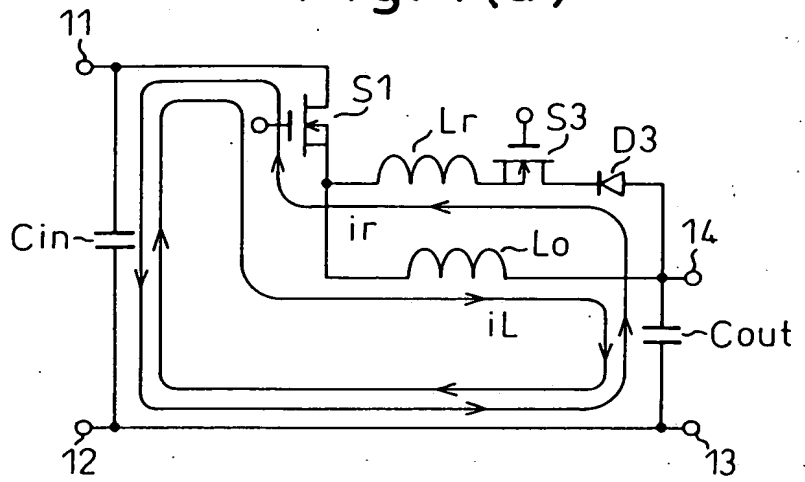


Fig. 4(e)

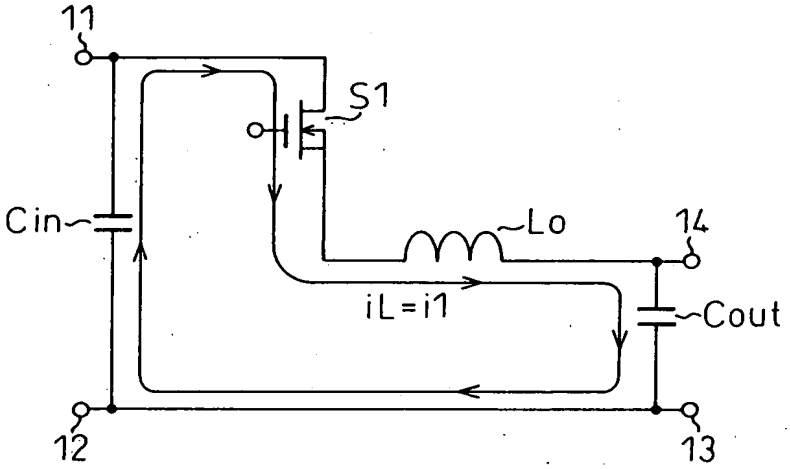


Fig. 4(f)

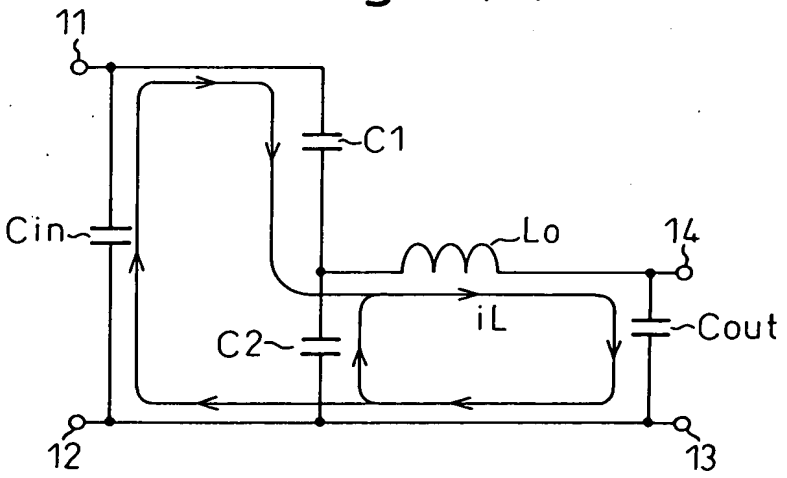


Fig.5

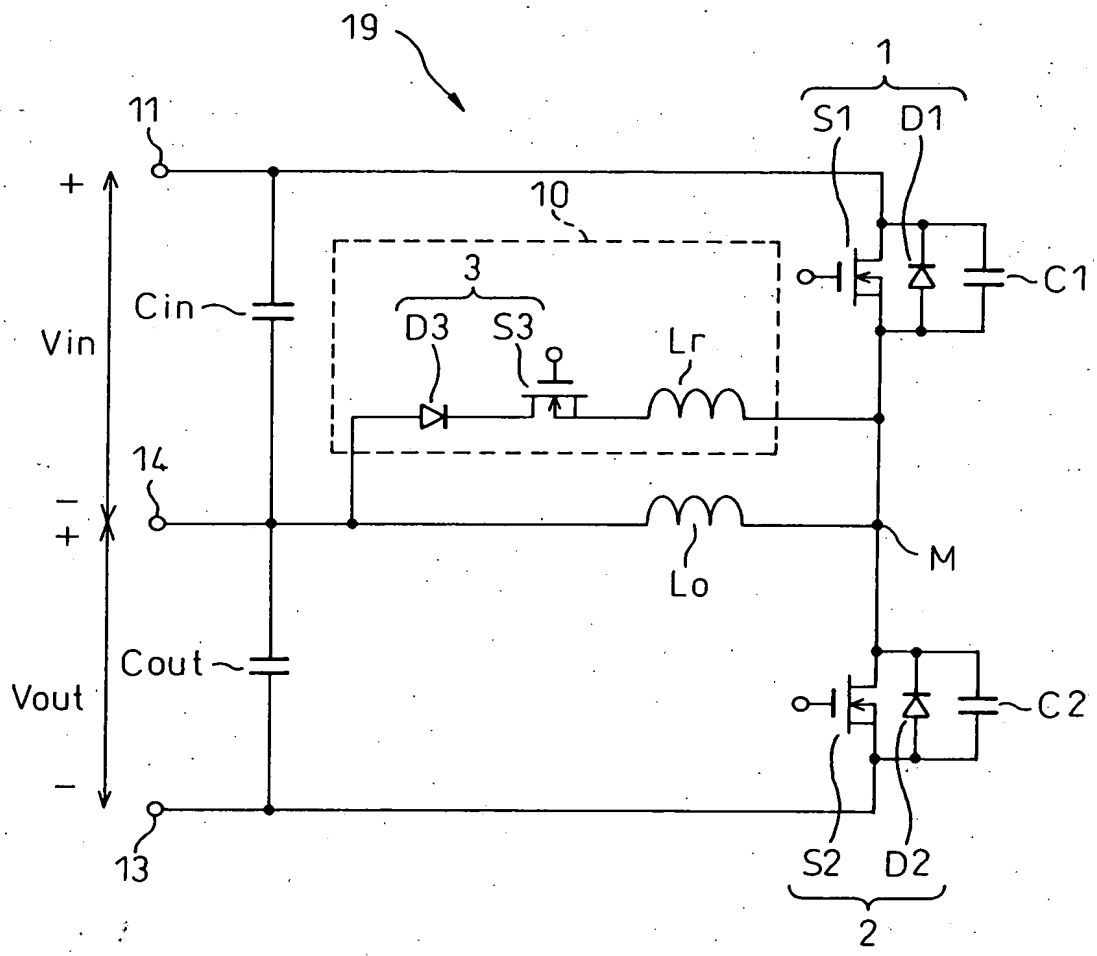


Fig.6

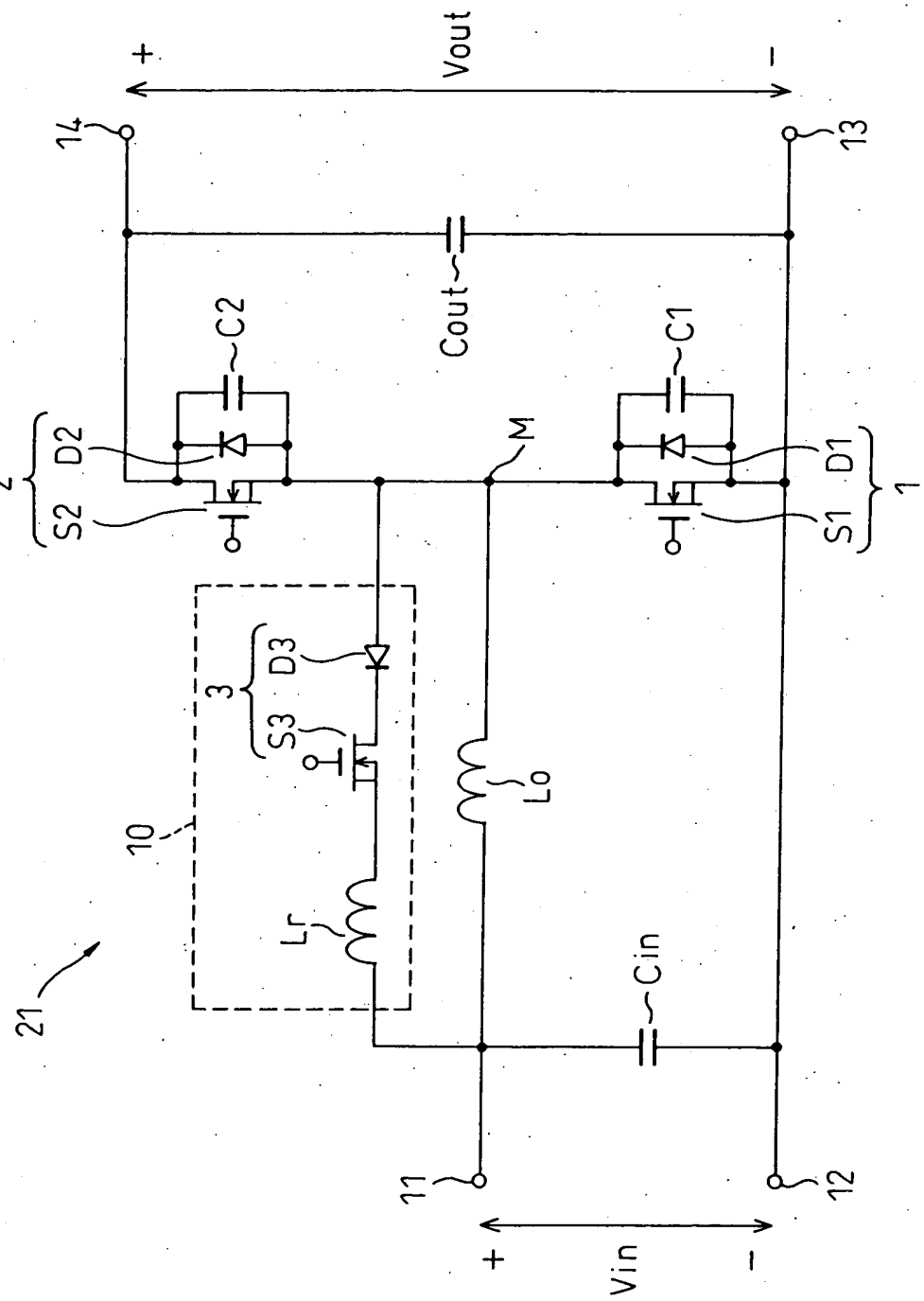

+
Vout
-
14
13
Cout
C2
C1
2
D2
S2
M
S1
D1
1
3
D3
S3
10
Lo
Lr
Cin
21
11
12
+
Vin
-

Fig.7

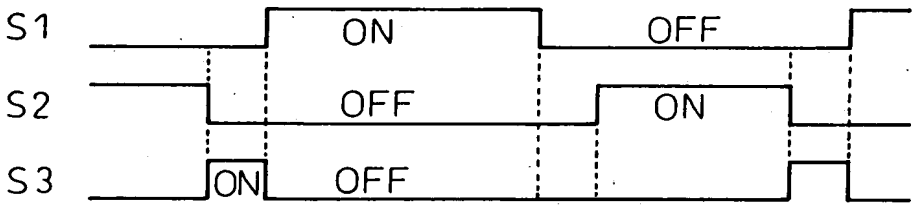


Fig.8

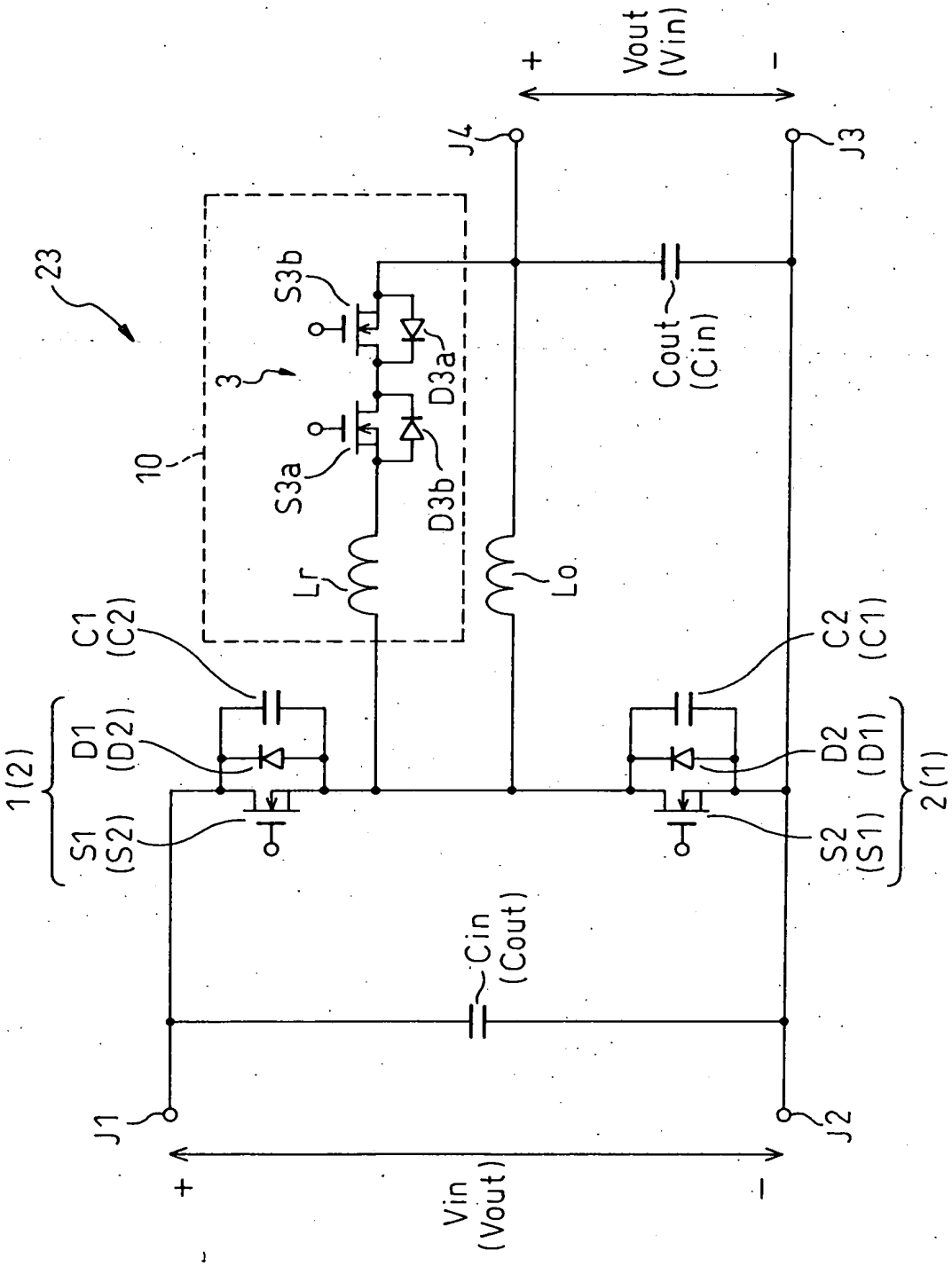

Vout
(Vin)
+
-
J4
J3
23
3
10
S3b
S3a
D3a
D3b
Cout
(Cin)
Lr
Lo
C1
(C2)
C2
(C1)
D1
(D2)
D2
(D1)
1(2)
2(1)
S1
(S2)
S2
(S1)
Cin
(Cout)
J1
J2
+
-
Vin
(Vout)

Fig.9

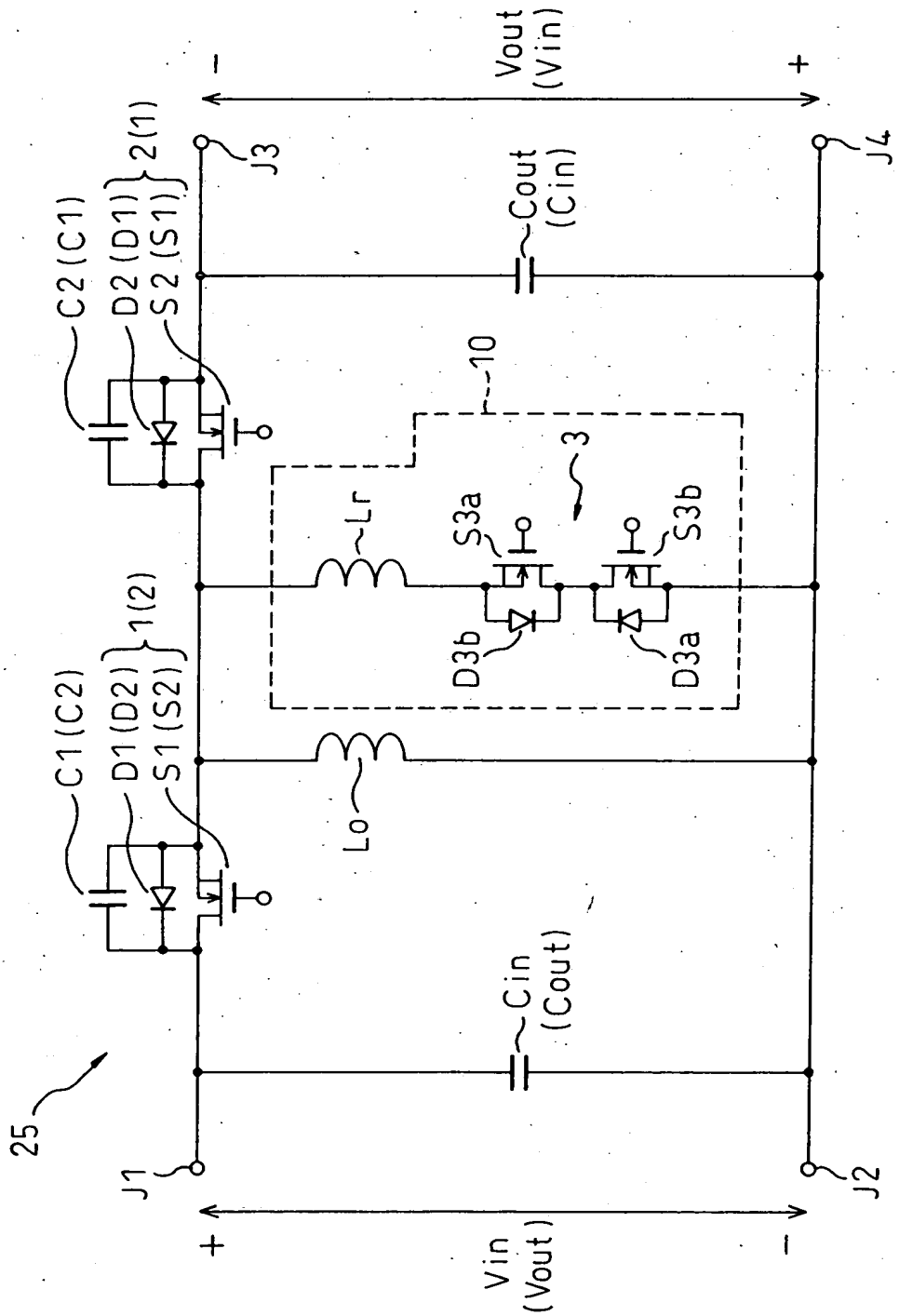

Vout
(Vin)
-
+
J3
J4
Cout
(Cin)
2(1)
C2(C1)
D2(D1)
S2(S1)
10
3
Lr
S3a
S3b
D3b
D3a
1(2)
C1(C2)
D1(D2)
S1(S2)
Lo
Cin
(Cout)
25
J1
J2
+
-
Vin
(Vout)

Fig.10

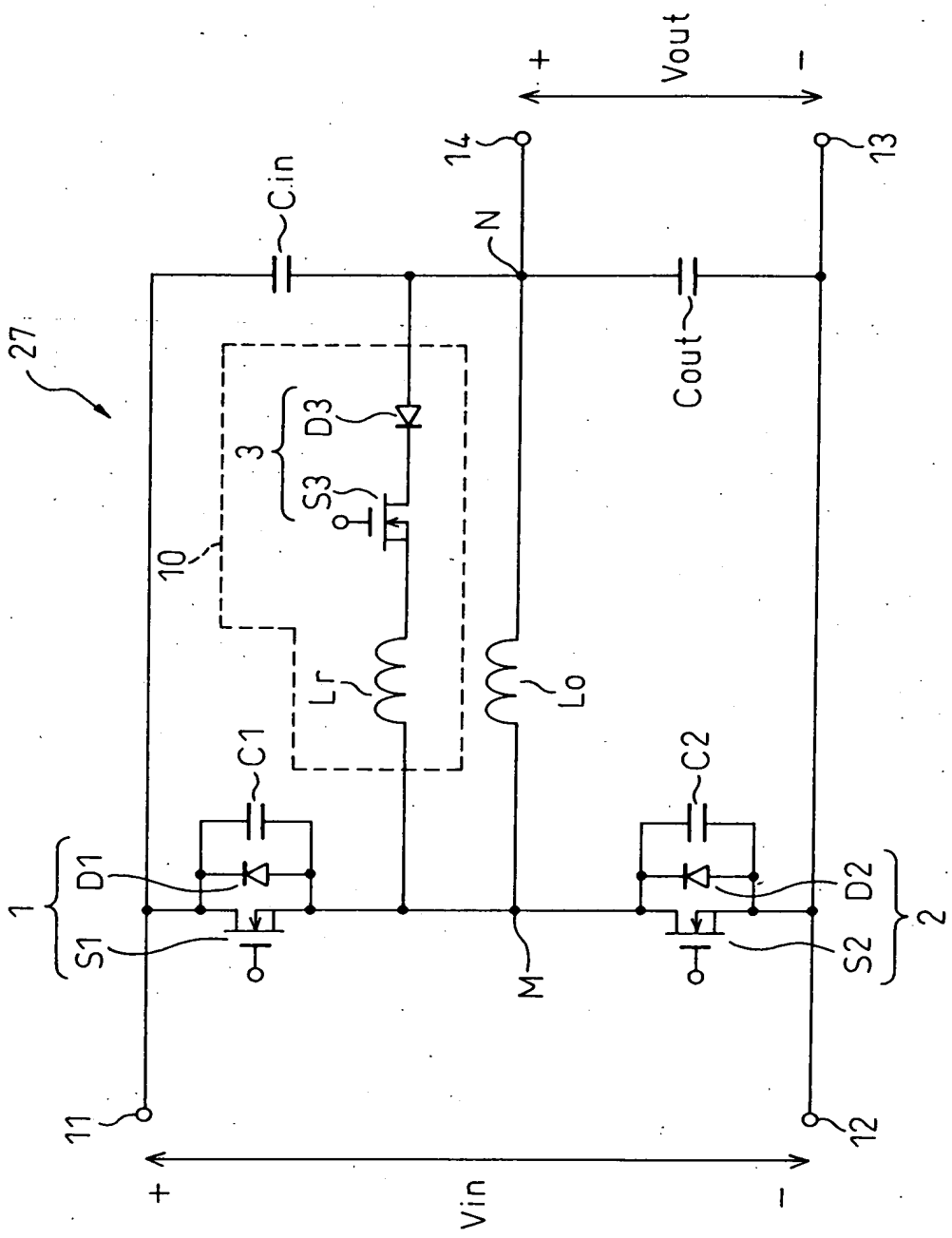

+
Vout
−
14
13
C.in
N
Cout
27
3
D3
S3
10
Lr
Lo
C1
C2
1
D1
S1
M
D2
S2
2
11
12
+
Vin
−

Fig.11

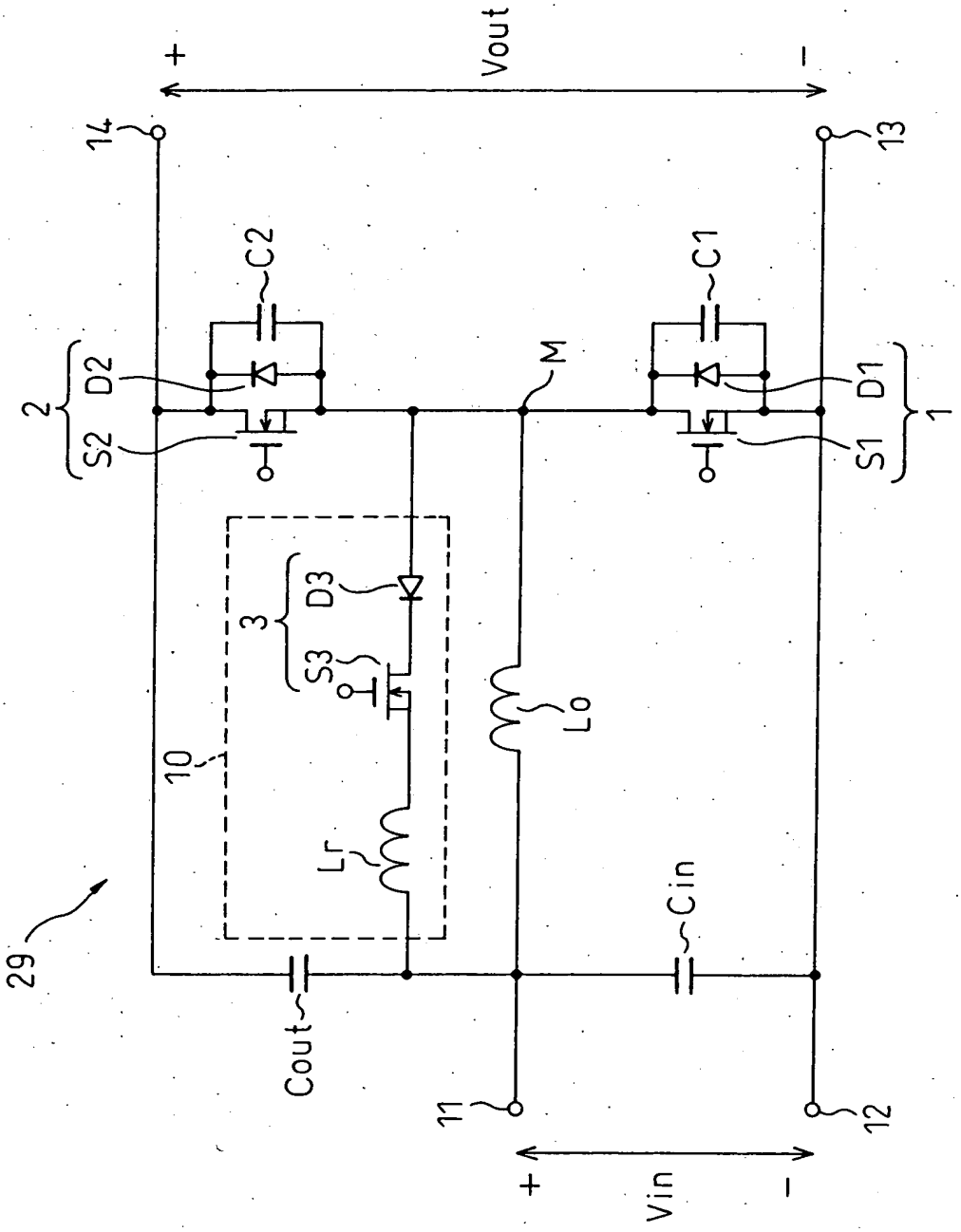

+
Vout
−
14
13
C2
C1
2
D2
S2
M
D1
S1
1
3
D3
S3
10
Lo
Lr
Cin
29
Cout
11
12
+
Vin
−

Fig.12

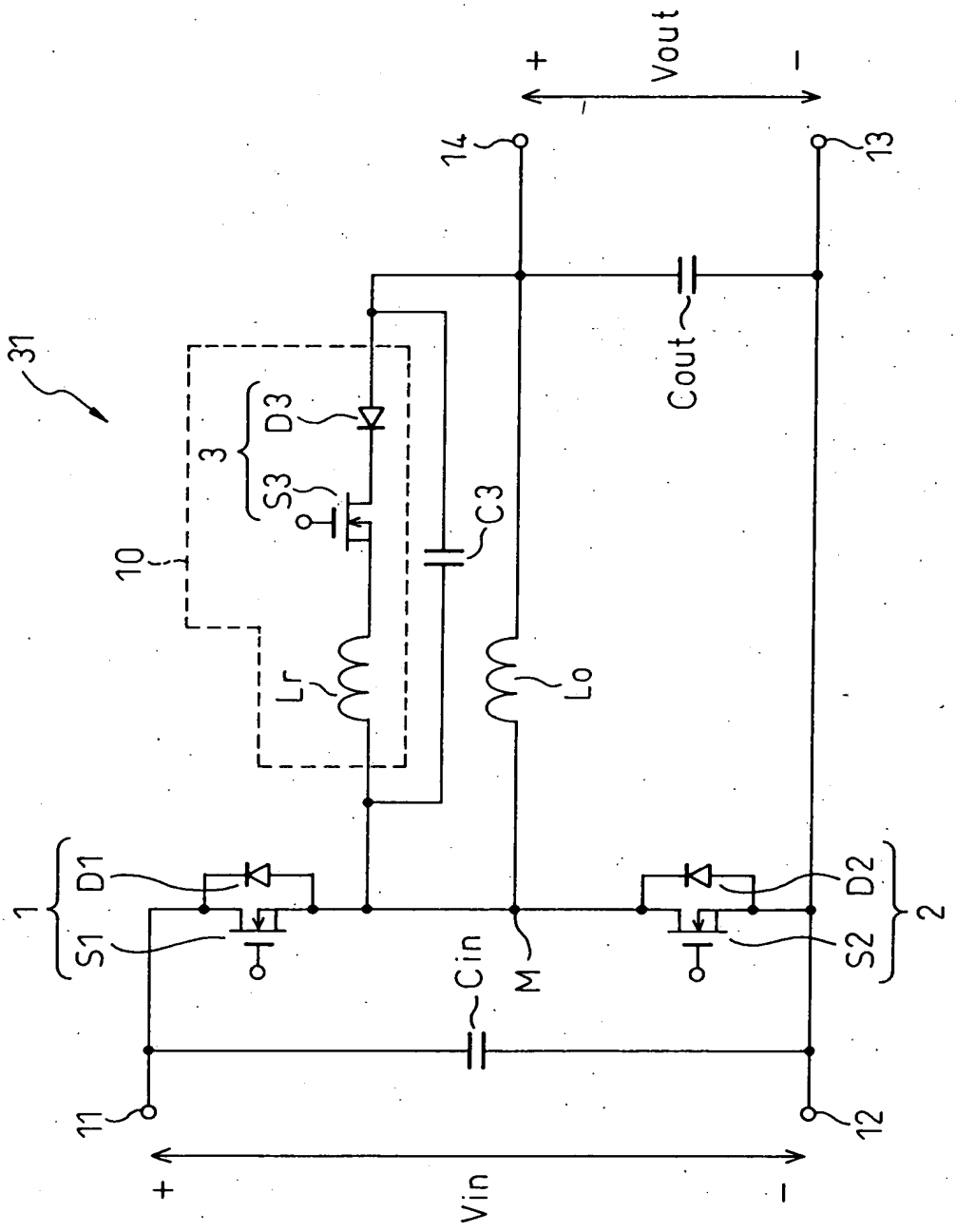


Fig.13

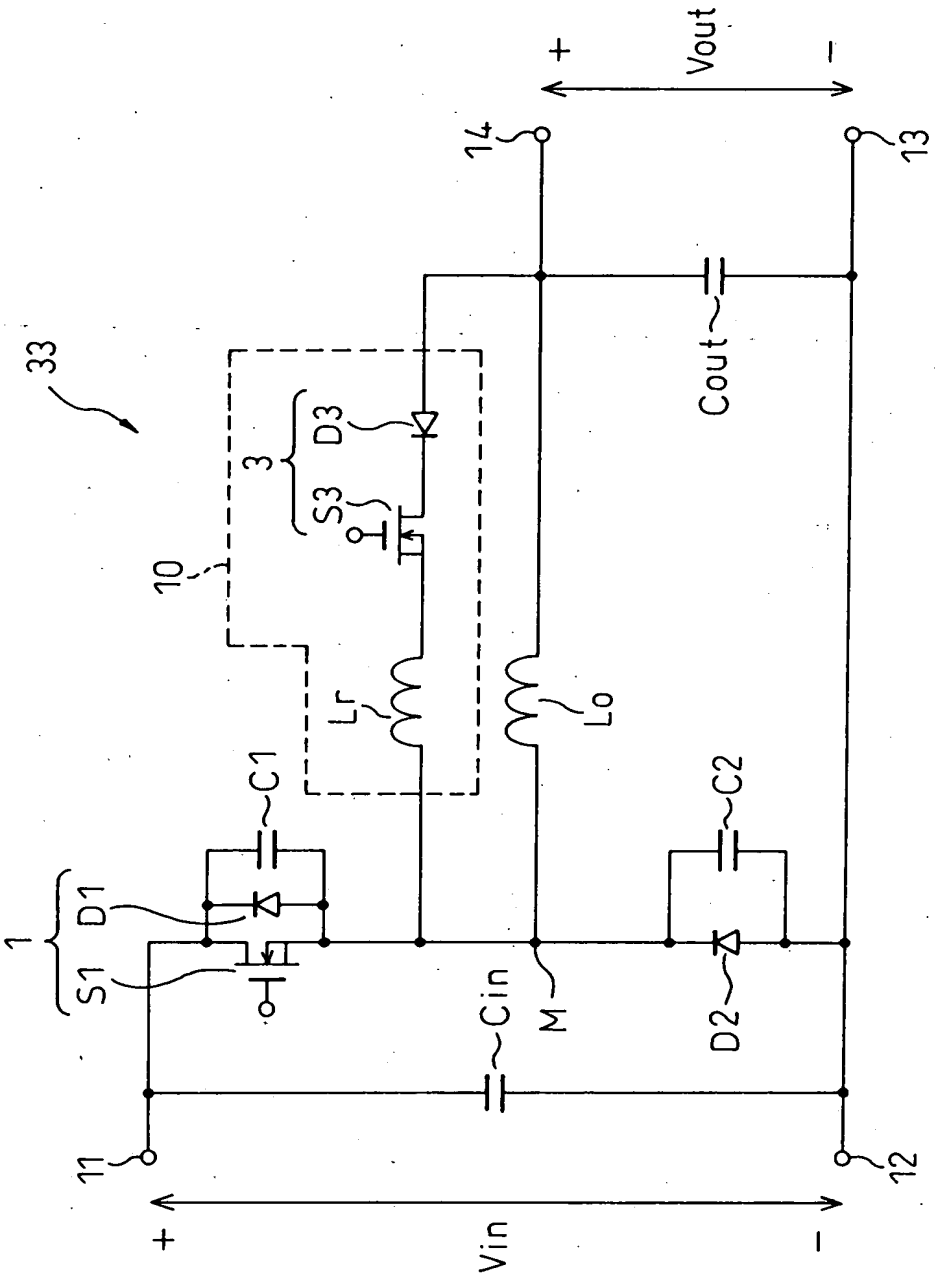
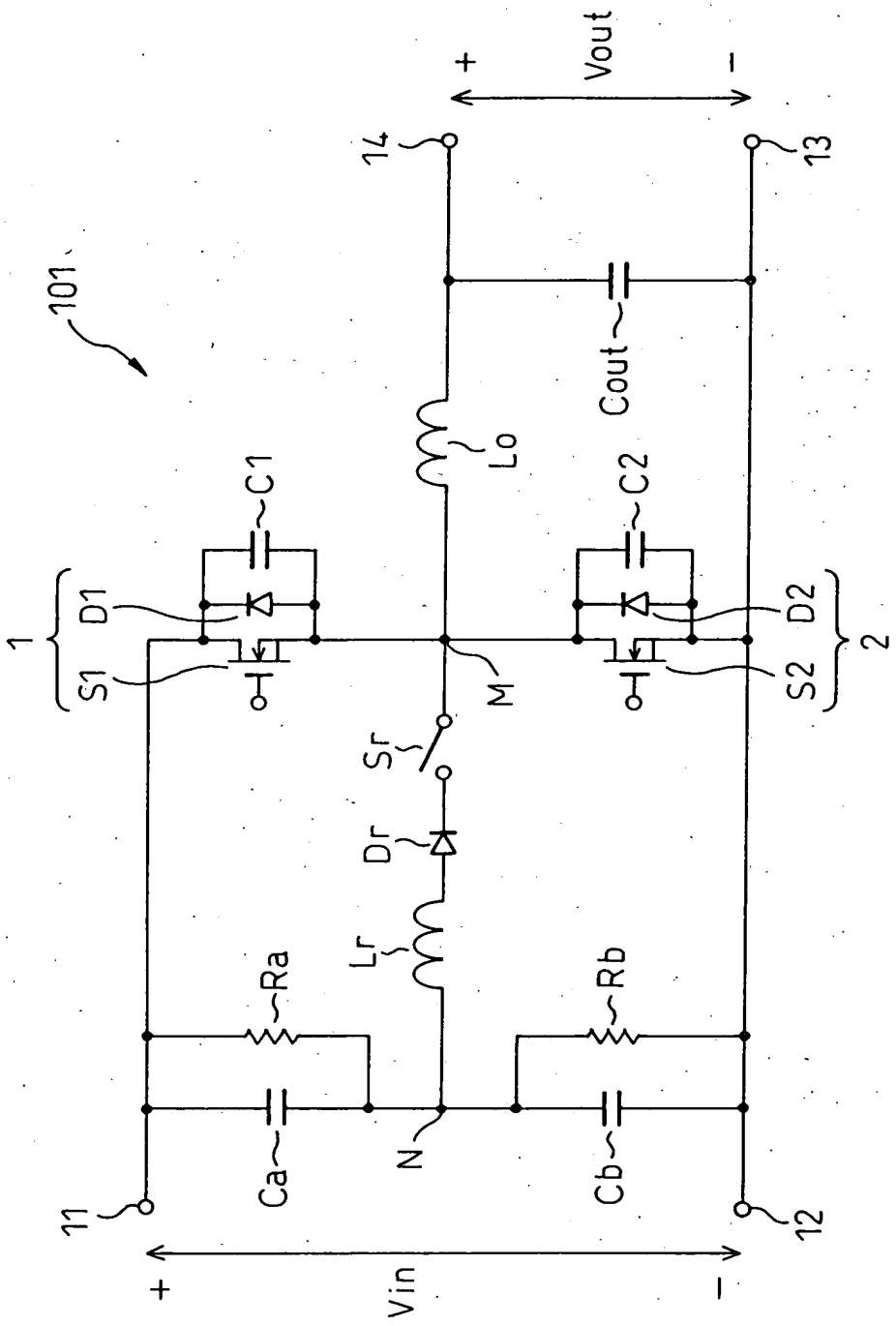


Fig.14


Vout
+
-
14
13
101
Cout
Lo
C1
C2
D1
D2
1
2
S1
S2
M
Sr
Dr
Lr
Ra
Rb
Ca
Cb
N
11
12
+
Vin
-